

IN THE CLAIMS:

Please amend the claims as set forth below without prejudice or disclaimer. This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (Currently Amended): A method of cutting a semiconductor substrate, the method comprising the steps of:

irradiating a semiconductor substrate having a sheet bonded thereto by way of a die-bonding resin layer with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region caused by photon absorption only within the semiconductor substrate, the modified region forming a part which is intended to be cut; and

expanding the sheet after forming the part which is intended to be cut, to cut and separate the semiconductor substrate with the die-bonding resin layer bonded thereto into adjacent separated portions of the semiconductor substrate each having at least a portion of the die-bonding resin layer bonded thereto, so as to form a gap between the adjacent separated portions of the semiconductor substrate, and so as to cut and separate at least the semiconductor substrate along the part which is intended to be cut, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 2 (Currently Amended): A method of cutting a semiconductor substrate, the method comprising the steps of:

irradiating a semiconductor substrate having a sheet bonded thereto by way of a die-bonding resin layer with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a modified region including a molten processed region only within the semiconductor substrate, the modified region including the molten processed region forming a part which is intended to be cut; and

expanding the sheet after forming the part which is intended to be cut, to cut and separate the semiconductor substrate with the die-bonding resin layer bonded thereto into adjacent separated portions of the semiconductor substrate each having at least a portion of the die-bonding resin layer bonded thereto, so as to form a gap between the adjacent separated portions of the semiconductor substrate, and so as to cut and separate at least the semiconductor substrate along the part which is intended to be cut, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 3 (Currently Amended): A method of cutting a semiconductor substrate, the method comprising the steps of:

irradiating a semiconductor substrate having a sheet bonded thereto by way of a die-bonding resin layer with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region only within the semiconductor substrate, the modified region forming a part which is intended to be cut; and

expanding the sheet after forming the part which is intended to be cut, to cut and separate the semiconductor substrate with the die-bonding resin layer bonded thereto into adjacent separated portions of the semiconductor substrate each having at least a portion of the die-bonding resin layer bonded thereto, so as to form a gap between the adjacent separated portions of the semiconductor substrate, and so as to cut and separate at least the semiconductor substrate along the part which is intended to be cut, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 4 (Canceled).

Claim 5 (Previously Presented): A method of cutting a semiconductor substrate according to claim 3, wherein the modified region is a molten processed region.

Claim 6 (Canceled).

Claim 7 (Previously Presented): A method of cutting a semiconductor substrate according to claim 1, wherein a fracture is caused to reach a front face of the semiconductor substrate on the laser light entrance side from the part which is intended to be cut acting as a start point.

Claim 8 (Previously Presented): A method of cutting a semiconductor substrate according to claim 2, wherein a fracture is caused to reach a front face of the semiconductor

substrate on the laser light entrance side from the part which is intended to be cut acting as a start point.

Claim 9 (Previously Presented): A method of cutting a semiconductor substrate according to claim 3, wherein a fracture is caused to reach a front face of the semiconductor substrate on the laser light entrance side from the part which is intended to be cut acting as a start point.

Claim 10 (Canceled).

Claim 11 (Previously Presented): A method of cutting a semiconductor substrate according to claim 1, wherein a fracture is caused to reach a rear face of the semiconductor substrate on the side opposite from the laser light entrance side from the part which is intended to be cut acting as a start point.

Claim 12 (Previously Presented): A method of cutting a semiconductor substrate according to claim 2, wherein a fracture is caused to reach a rear face of the semiconductor substrate on the side opposite from the laser light entrance side from the part which is intended to be cut acting as a start point.

Claim 13 (Previously Presented): A method of cutting a semiconductor substrate according to claim 3, wherein a fracture is caused to reach a rear face of the semiconductor

substrate on the side opposite from the laser light entrance side from the part which is intended to be cut acting as a start point.

Claim 14 (Canceled).

Claim 15 (Previously Presented): A method of cutting a semiconductor substrate according to claim 1, wherein a fracture is caused to reach a front face of the semiconductor substrate on the laser light entrance side and a rear face on the side opposite therefrom from the part which is intended to be cut acting as a start point.

Claim 16 (Previously Presented): A method of cutting a semiconductor substrate according to claim 2, wherein a fracture is caused to reach a front face of the semiconductor substrate on the laser light entrance side and a rear face on the side opposite therefrom from the part which is intended to be cut acting as a start point.

Claim 17 (Previously Presented): A method of cutting a semiconductor substrate according to claim 3, wherein a fracture is caused to reach a front face of the semiconductor substrate on the laser light entrance side and a rear face on the side opposite therefrom from the part which is intended to be cut acting as a start point.

Claim 18 (Canceled).

Claim 19 (Currently Amended): A method of cutting a semiconductor substrate, the method comprising the steps of:

irradiating a semiconductor substrate having a sheet bonded thereto by way of a die-bonding resin layer with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region caused by photon absorption only within the semiconductor substrate, the modified region forming a part which is intended to be cut;

generating a stress in the semiconductor substrate along the part which is intended to be cut after forming the part which is intended to be cut, so as to cut the semiconductor substrate along the part which is intended to be cut; and

expanding the sheet after the step of cutting the semiconductor substrate, so as to separate at least the semiconductor substrate along the part which is intended to be cut, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 20 (Currently Amended): A method of cutting a semiconductor substrate, the method comprising the steps of:

irradiating a semiconductor substrate having a sheet bonded thereto by way of a die-bonding resin layer with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a modified region

caused by multiphoton absorption only within the semiconductor substrate, the modified region forming a part which is intended to be cut;

generating a stress in the semiconductor substrate along the part which is intended to be cut after forming the part which is intended to be cut, so as to cut the semiconductor substrate along the part which is intended to be cut; and

expanding the sheet after cutting the semiconductor substrate, so as to separate at least the semiconductor substrate along the part which is intended to be cut, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 21 (Currently Amended): A method of cutting a semiconductor substrate, the method comprising the steps of:

irradiating a semiconductor substrate having a sheet bonded thereto by way of a die-bonding resin layer with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region only within the semiconductor substrate, the modified region forming a part which is intended to be cut;

generating a stress in the semiconductor substrate along the part which is intended to be cut after forming the part which is intended to be cut, so as to cut the semiconductor substrate along the part which is intended to be cut; and

expanding the sheet after cutting the semiconductor substrate, so as to separate at least the semiconductor substrate along the part which is intended to be cut, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 22 (Previously Presented): A method of cutting a semiconductor substrate according to claim 21, wherein the modified region is a molten processed region.

Claim 23 (Withdrawn): A method of cutting a semiconductor substrate having a front face formed with a functional device along a line to cut, the method comprising the steps of:

irradiating the semiconductor substrate with laser light while using a rear face of the semiconductor substrate as a laser light entrance surface and locating a light-converging point within the semiconductor substrate, so as to form a modified region, and causing the modified region to form a cutting start region within the semiconductor substrate inside of the laser light entrance surface by a predetermined distance along the line to cut;

attaching an expandable holding member to the rear face of the semiconductor substrate by way of a die-bonding resin layer after forming the cutting start region; and

expanding the holding member after attaching the holding member, so as to cut the semiconductor substrate and die-bonding resin layer along the line to cut.

Claim 24 (Withdrawn): A method of cutting a semiconductor substrate according to claim 23, further comprising the step of grinding the rear face of the semiconductor substrate such that the semiconductor substrate attains a predetermined thickness before forming the cutting start region.

Claim 25 (Withdrawn): A method of cutting a semiconductor substrate according to claim 23, wherein the modified region includes a molten processed region.

Claim 26 (Withdrawn): A method of cutting a semiconductor substrate according to claim 23, wherein a fracture is caused to reach the front face of the semiconductor substrate from the cutting start region acting as a start point when forming the cutting start region.

Claim 27 (Withdrawn): A method of cutting a semiconductor substrate according to claim 23, wherein a fracture is caused to reach the rear face of the semiconductor substrate from the cutting start region acting as a start point when forming the cutting start region.

Claim 28 (Withdrawn): A method of cutting a semiconductor substrate according to claim 23, wherein a fracture is caused to reach the front and rear faces of the semiconductor substrate from the cutting start region acting as a start point when forming the cutting start region.

Claim 29 (Withdrawn): A method of cutting a semiconductor substrate according to claim 23, wherein the modified region includes at least a molten processed region positioned on the opposite side of the molten processed region from the laser light incident face.

Claim 30 (Withdrawn): A method of cutting a semiconductor substrate according to claim 24, wherein the modified region includes at least a molten processed region positioned on the opposite side of the molten processed region from the laser light incident face.

Claim 31 (Withdrawn): A method of cutting a semiconductor substrate according to claim 25, wherein the modified region includes at least a molten processed region positioned on the opposite side of the molten processed region from the laser light incident face.

Claim 32 (Withdrawn): A method of cutting a semiconductor substrate having a front face formed with a plurality of functional devices to divide into every said functional devices, the method comprising the steps of:

attaching a sheet to the rear face of the semiconductor substrate by way of a die-bonding resin layer;

after the attachment of the sheet to the rear face of the semiconductor substrate, forming modified regions within the substrate in matrix so that the modified regions are located just under spaces between the functional devices adjacent to each other by irradiating the semiconductor substrate with laser light while using a front face of the semiconductor substrate as a laser light entrance surface and locating a light-coverging point within the semiconductor substrate, to divide the semiconductor substrate into semiconductor chips, each having the functional device thereon;

after division of the semiconductor substrate, cutting the die-bonding resin layer along a cutting surface of the semiconductor chip by expanding the sheet; and

after cutting of the die-bonding resin layer, picking up the semiconductor chip from the sheet while the picked up semiconductor chip has the die-bonding resin layer on a rear surface of the picked up semiconductor chip.

Claim 33 (Currently Amended): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate, the manufacturing method comprising:

irradiating a semiconductor substrate, having a sheet bonded thereto by way of a die-bonding resin layer and having a surface formed with at least one semiconductor device, with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region caused by photon absorption only within the semiconductor substrate, the modified region forming a part which is intended to be cut; and

expanding the sheet after forming the part which is intended to be cut, to cut and separate the semiconductor substrate with the die-bonding resin layer bonded thereto into adjacent separated portions of the semiconductor substrate each having at least a portion of the die-bonding resin layer bonded thereto, so as to form a gap between the adjacent separated portions of the semiconductor substrate, and so as to cut and separate at least the semiconductor substrate along the part which is intended to be cut, with such separating thereby providing at least one manufactured semiconductor device, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 34 (Currently Amended): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate, the manufacturing method comprising:

irradiating a semiconductor substrate, having a sheet bonded thereto by way of a die-bonding resin layer and having a surface formed with at least one semiconductor device, with

laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a modified region including a molten processed region only within the semiconductor substrate, the modified region including the molten processed region forming a part which is intended to be cut; and

expanding the sheet after forming the part which is intended to be cut, to cut and separate the semiconductor substrate with the die-bonding resin layer bonded thereto into adjacent separated portions of the semiconductor substrate each having at least a portion of the die-bonding resin layer bonded thereto, so as to form a gap between the adjacent separated portions of the semiconductor substrate, and so as to cut and separate at least the semiconductor substrate along the part which is intended to be cut, with such separating thereby providing at least one manufactured semiconductor device, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 35 (Currently Amended): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate, the manufacturing method comprising:

irradiating a semiconductor substrate, having a sheet bonded thereto by way of a die-bonding resin layer and having a surface formed with at least one semiconductor device, with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to

form a modified region only within the semiconductor substrate, the modified region forming a part which is intended to be cut; and

expanding the sheet after forming the part which is intended to be cut, to cut and separate the semiconductor substrate with the die-bonding resin layer bonded thereto into adjacent separated portions of the semiconductor substrate each having at least a portion of the die-bonding resin layer bonded thereto, so as to form a gap between the adjacent separated portions of the semiconductor substrate, and so as to cut and separate at least the semiconductor substrate along the part which is intended to be cut, with such separating thereby providing at least one manufactured semiconductor device, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 36 (Canceled).

Claim 37 (Currently Amended): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor device, the manufacturing method comprising:

irradiating a semiconductor substrate, having a sheet bonded thereto by way of a die-bonding resin layer and having a surface formed with at least one semiconductor device, with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region caused by photon absorption only within the semiconductor substrate, the modified region forming a part which is intended to be cut;

generating a stress in the semiconductor substrate along the part which is intended to be cut after forming the part which is intended to be cut, so as to cut the semiconductor substrate along the part which is intended to be cut; and

expanding the sheet after cutting the semiconductor substrate, so as to separate at least the semiconductor substrate along the part which is intended to be cut, with such separating thereby providing at least one manufactured semiconductor device, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 38 (Currently Amended): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate, the manufacturing method comprising:

irradiating a semiconductor substrate, having a sheet bonded thereto by way of a die-bonding resin layer and having a surface formed with at least one semiconductor device, with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a modified region caused by multiphoton absorption only within the semiconductor substrate, the modified region forming a part which is intended to be cut;

generating a stress in the semiconductor substrate along the part which is intended to be cut after forming the part which is intended to be cut, so as to cut the semiconductor substrate along the part which is intended to be cut; and

expanding the sheet after cutting the semiconductor substrate, so as to separate at least the semiconductor substrate along the part which is intended to be cut, with such separating thereby providing at least one manufactured semiconductor device, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 39 (Currently Amended): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate, the manufacturing method comprising:

irradiating a semiconductor substrate, having a sheet bonded thereto by way of a die-bonding resin layer and having a surface formed with at least one semiconductor device, with laser light, having a wavelength that enables the laser light to transmit through the semiconductor substrate, while locating a light-converging point within the semiconductor substrate, so as to form a modified region only within the semiconductor substrate, the modified region forming a part which is intended to be cut;

generating a stress in the semiconductor substrate along the part which is intended to be cut after forming the part which is intended to be cut, so as to cut the semiconductor substrate along the part which is intended to be cut; and

expanding the sheet after cutting the semiconductor substrate, so as to separate at least the semiconductor substrate along the part which is intended to be cut, with such separating thereby providing at least one manufactured semiconductor device, wherein the die-bonding resin layer is torn apart along with the semiconductor substrate by expanding the sheet.

Claim 40 (Withdrawn): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate having a front face formed with a functional device along a line to cut, the manufacturing method comprising:

irradiating the semiconductor substrate with laser light while using a rear face of the semiconductor substrate as a laser light entrance surface and locating a light-converging point within the semiconductor substrate, so as to form a modified region, and causing the modified region to form a cutting start region within the semiconductor substrate inside of the laser light entrance surface by a predetermined distance along the line to cut;

attaching an expandable holding member to the rear face of the semiconductor substrate by way of a die-bonding resin layer after forming the cutting start region; and

expanding the holding member after attaching the holding member, so as to cut the semiconductor substrate and die-bonding resin layer along the line to cut, with such cutting thereby providing at least one manufactured semiconductor device.

Claim 41 (Withdrawn): A method of manufacturing a semiconductor device formed using a method of cutting a semiconductor substrate having a front face formed with a plurality of functional devices to divide into each of said functional devices, the manufacturing method comprising:

attaching a sheet to the rear face of the semiconductor substrate by way of a die-bonding resin layer;

after the attachment of the sheet to the rear face of the semiconductor substrate, forming modified regions within the substrate in matrix so that the modified regions are located just under spaces between the functional devices adjacent to each other by irradiating the

semiconductor substrate with laser light while using a front face of the semiconductor substrate as a laser light entrance surface and locating a light-converging point within the semiconductor substrate, to divide the semiconductor substrate into semiconductor chips, each having the functional device thereon;

after division of the semiconductor substrate, cutting the die-bonding resin layer along a cutting surface of the semiconductor chip by expanding the sheet; and

after cutting of the die-bonding resin layer, picking up the semiconductor chip from the sheet while the picked up semiconductor chip has the die-bonding resin layer on a rear surface of the picked up semiconductor chip, such picked up semiconductor chip comprising a manufactured semiconductor device.

Claim 42 (Previously Presented): A method of cutting a semiconductor substrate according to claim 1, wherein the irradiating step is performed so as to form the modified region by multiphoton absorption within the semiconductor substrate.

Claim 43 (Previously Presented): A method of cutting a semiconductor substrate according to claim 19, wherein the irradiating step is performed so as to form the modified region by multiphoton absorption within the semiconductor substrate.

Claim 44 (Previously Presented): A method of manufacturing a semiconductor device according to claim 33, wherein the irradiating step is performed so as to form the modified region by multiphoton absorption within the semiconductor substrate.

Claim 45 (Previously Presented): A method of manufacturing a semiconductor device according to claim 37, wherein the irradiating step is performed so as to form the modified region by multiphoton absorption within the semiconductor substrate.

Claim 46 (Currently Amended): A method of cutting a semiconductor substrate according to claim 1, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 47 (Currently Amended): A method of cutting a semiconductor substrate according to claim 2, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 48 (Currently Amended): A method of cutting a semiconductor substrate according to claim 3, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 49 (Canceled).

Claim 50 (Currently Amended): A method of cutting a semiconductor substrate according to claim 19, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 51 (Currently Amended): A method of cutting a semiconductor substrate according to claim 20, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 52 (Currently Amended): A method of cutting a semiconductor substrate according to claim 21, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 53 (Currently Amended): A method of manufacturing a semiconductor device according to claim 33, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 54 (Currently Amended): A method of manufacturing a semiconductor device according to claim 34, wherein the ~~expanding separates the die bonding resin layer along with the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 55 (Currently Amended): A method of manufacturing a semiconductor device according to claim 35, wherein the ~~expanding separates the die bonding resin layer along with~~

~~the semiconductor substrate~~ sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 56 (Canceled).

Claim 57 (Currently Amended): A method of manufacturing a semiconductor device according to claim 37, wherein the ~~expanding separates the die bonding resin layer along with~~ the semiconductor substrate sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 58 (Currently Amended): A method of manufacturing a semiconductor device according to claim 38, wherein the ~~expanding separates the die bonding resin layer along with~~ the semiconductor substrate sheet is expanded by pulling peripheral portions of the sheet outwardly.

Claim 59 (Currently Amended): A method of manufacturing a semiconductor device according to claim 39, wherein the ~~expanding separates the die bonding resin layer along with~~ the semiconductor substrate sheet is expanded by pulling peripheral portions of the sheet outwardly.